PHOE 4 Medical Physics: The Art and Science of Healing

Prerequisite: PUC Pass. **Total hours: 45**

Course Title: **Medical Physics**	Course Credits: 3
Total Contact Hours: 39	Self-study Hours: 6
Formative Assessment Marks: 40	Summative Assessment Marks: 60
Duration of ESA: 1 Hr 30 min	

The objective of the course:

1. To promote the application of Physics
2. Understand the anatomy of the nervous system and its signal measurements (EMG, CAT).
3. Analyze and understand the applications of the imaging techniques transmission (x- ray and ultrasound)
4. Updating the knowledge in recent trends in medical field.

UNIT 1: Physics of human body

Mechanics of human body: static, dynamic and frictional forces in the body, composition, properties and functions of bones, Heat and temperature, temperature scales, clinical thermometer, thermography, heat therapy, heat loss from body. Pressure in the body, skull, eye and urinary bladder. **(8 Hours)**

Physics of Respiratory and cardiovascular system: Exchange of gases, law of partial pressure, surface tension, equation of continuity, airways, blood and lung interactions, measurement of lung volume, alveoli and breathing mechanism, blood pressure and measurement. **(7 Hours)**

UNIT 2: Imaging and Therapy

Electricity in the body: Nervous system and neuron, Action potential, electrical signals from muscle, eye and heart. **(7 Hours)**

Medical Imaging Basics: Introduction to medical imaging, overview of medical imaging techniques (X-rays, CT scans, ECG, MRI) and limitations. **(8 Hours)**

UNIT 3: Nuclear Medicine and Radiation Therapy

Introduction to radioactivity, Radionuclide, Radiation exposure and its effects on human health, Principles of radiation therapy, Radiation detectors and imaging systems, Imaging and therapy techniques in nuclear medicine, Regulatory frameworks for radiation safety, Radiation protection practices and equipment.

(8 Hours)

UNIT 4: Emerging Technologies in Medical Physics

Artificial intelligence and machine learning in medical physics, Big data analytics in medical physics, Advanced imaging techniques in medical physics **(7 Hours)**

Textbooks:

1. Biology in Physics: Is Life Matter? K.A. Bogdanov and Konstantin Bogdanov, Academic press, 1999.
2. John R. Cameron and James G. Skofronick, John Wiley &Sons –Medical Physics, Wiley – InterscicencePublications ,1978.
3. 2. R.S.Khandpur – Handbook of Biomedical Instrumentation, Tata McGraw Hill Publication Co.,Delhi,1987.
4. Medical Imaging: Principles and Practices by David Dowsett and Patrick Kench
5. Radiation Oncology: Rationale, Technique, Results by James D. Cox, et al.